

# ENERGY TECHNOLOGY ENGINEERING CENTER

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ROCKETDYNE DIVISION, Boeing North American

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DRR 26079

TITLE: **Building 64 Side Yard Core Sampling Plan**

## - APPROVALS -

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## 1. INTRODUCTION

This document provides the procedures for performing a radiological soil contamination survey for the Building 64 Side Yard. A qualitative gamma scan of the area has been completed. This plan, therefore, concerns soil sampling to determine that no further subsurface radioactive contamination exists in the Side Yard of Building 64. Samples of soil will be analyzed by gamma spectrometry, and selected samples may be sent to a third party vendor for alpha spectrometry.

Any areas that are found to exceed the approved limits (Ref 1, 5) on radioactive contamination of soil will be decontaminated as part of the completion of the decommissioning of the Side Yard. If the soil is determined to be free of radioactivity, then a formal statistical soil sampling program and a gamma scan will be conducted to complete the data acquisition needed for release of the area from radiological controls. The protocol for this final survey will be provided in another survey plan.

### 1.1 Facility History

Building 64 was a facility used for the storage of unirradiated uranium (of various enrichments), fuel material, and fuel elements manufactured at De Soto and the Santa Susana Field Laboratory. In addition, equipment and containers contaminated with radioactive materials were periodically stored in the building's yards. Operations at the facility were terminated in 1989, and the building was emptied of all contents (both radioactive and non-radioactive) by 1993. Between the period 1993 - 1996, the building was decontaminated. In 1996, the building was approved for demolition by the United States Department of Energy (DOE) and the State of California Department of Health Services (DHS), and the structure was subsequently demolished in 1997.

Radioactive contamination of the soils and grounds to the east of the facility apparently occurred initially in 1962 and was confirmed by surface gamma scan and soil samples. On several different occasions, the contamination was remediated. During the Area IV Characterization Survey conducted in 1994-1996, elevated readings were noted in the Side Yard. In 1996, an abandoned septic tank and leach field were excavated. During the excavation, it was found that this tank and leach piping had removable Cs-137 contamination ranging up to 800,000 dpm/100 cm<sup>2</sup>. This tank and associated piping were removed in 1996 and processed as radioactive waste.

Additional soil sampling was performed during this excavation, including the contaminated area extending from the Building 64 side yard, southeast under the main SSFL access road ("G" Street), to an area approximately 50 yards in diameter on the south side of "G" Street was discovered. These contaminated areas were decontaminated, and it appears from surface gamma scanning that the soil areas beneath the building foundations, the surrounding yard areas, and the area south of "G" Street are now free of radioactive contamination.

This survey is intended to demonstrate that no subsurface contamination remains in the area along the drainage pathway for the septic tank / leach field.

## 2. SAMPLING APPROACH

This survey will be done in sequential stages until adequate data have been obtained to provide the needed information to confirm that the soil is below the applicable release criteria.

### 2.1 Area Layout and Preparation

To provide a location reference for the survey and sampling, Figure 1 shows the physical layout of the survey site, and the approximate locations of the sample locations. Prior to the start of work, the area will be surveyed and gridded to the staked reference locations used in the Area IV Characterization Survey (Ref 2). The sampling locations shall be identified at the site (using surveyor marking flags, or similar devices) This survey should be adequately documented to permit the relocation of sampling points even if the topography of the area changes. Several photographs showing the work area in relation to permanent landmarks shall be obtained. Additionally, photographs showing the survey locations shall be obtained.

Core samples will be taken by a third party vendor. Selection of the vendor will be performed by SHEA/ETEC personnel independently of this procedure.

Radiological oversight will be provided by a qualified radiation safety technician. Photographs of the survey instrumentation, sampling and analysis equipment, and the drilling operation shall also be obtained.

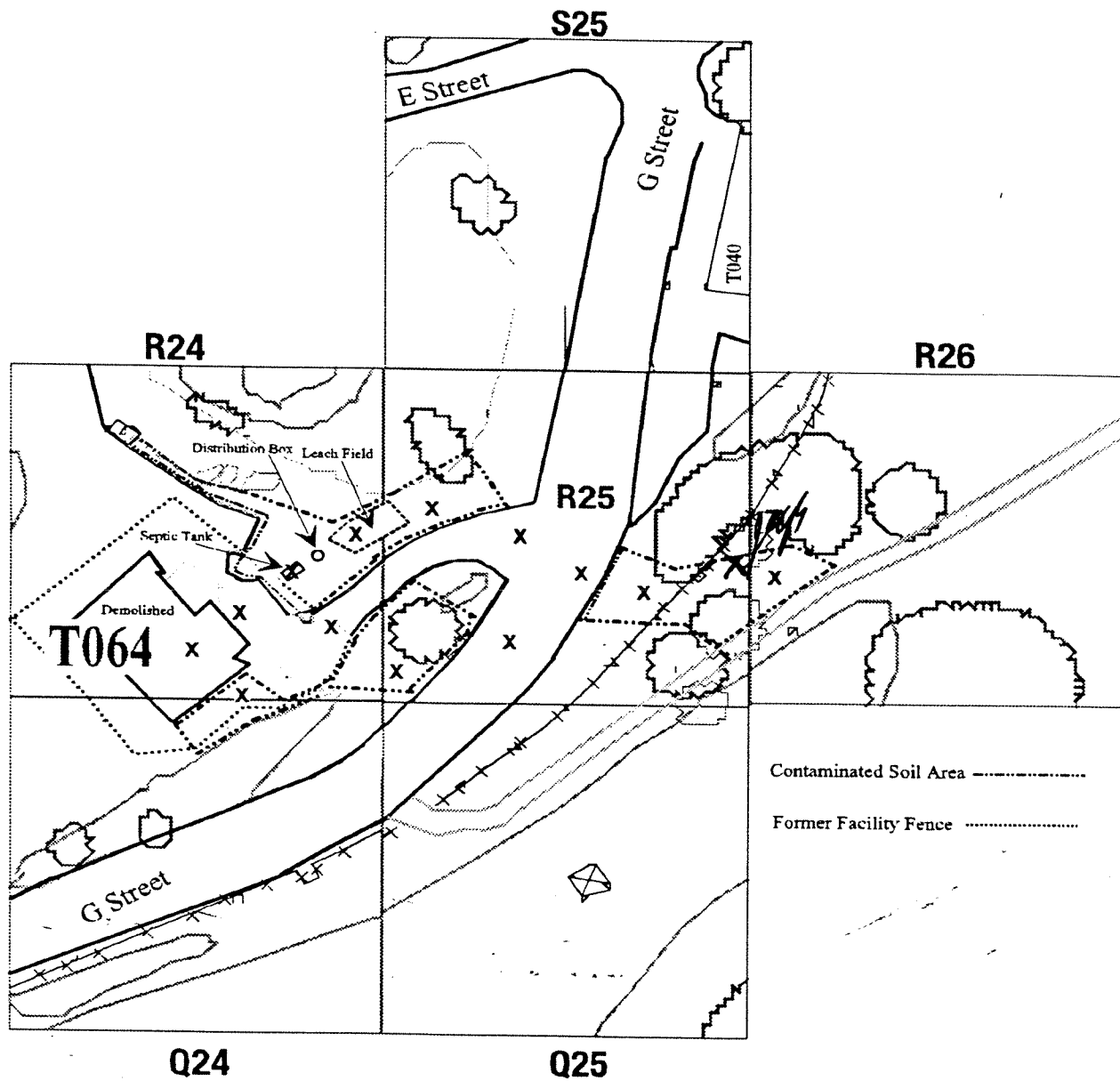


Figure 1 Position of Sampling Locations

## 2.2 Anticipated Scope of Work

Thirteen core sampling locations have been identified. In addition, additional sampling may be required if contaminated soils are located in the preliminary effort.

A gamma spectroscopic evaluation of each sample (primarily measuring the presence of Cs-137) will be conducted. Assuming an average depth to bedrock of approximately 6 feet, each sample location will be expected to produce three samples. This suggests a nominal sample throughput of 39 samples for gamma spectroscopic evaluation.

If the initial survey detects the presence of radioactive contamination, then appropriate remediation activities may be undertaken. Additional samples may be added to the work package as needed to fully characterize the contamination, and to verify that no further radioactive contamination remains.

## 2.3 Surface Exposure Rate

A direct qualitative scan of 100% of the area has been conducted using a 1x1-inch NaI gamma detector on a long handle to permit a surface scan of the ground. This scan was done in the same manner as developed for the Area IV Radiological Characterization Survey (Ref. 2). No noticeably elevated readings were identified.

These results suggest that no significant levels of soil contamination are present at the site.

## 2.4 Analytical Considerations

The most significant contaminant at the Side Yard was Cs-137, which can be easily detected by use of the XRHPGe gamma spectrometer at SSFL Building 100. Additional isotopes may be present in the soils, but past experience has suggested that these isotopes are only present in conjunction with Cesium-137. For the purposes of this survey, radioanalytical evaluation for alpha emitting isotopes, strontium, or other isotopes will not be performed unless significant levels of Cs-137 ( $> 100$  pCi/g) are discovered.

In such an eventuality, a maximum total of five samples will be sent for radiochemical analyses. These samples shall consist of the five samples displaying the highest levels of Cs-137 exceeding the control level of 100 pCi/g. If fewer than five samples exceed the 100 pCi/g criteria, then only those samples exceeding this administrative level need be submitted. Thermo-NuTech will be the laboratory of choice for these analyses; however, another analysis laboratory may be utilized if deemed necessary by ETEC/SHEA personnel.

## 2.5 Subsurface Soil Samples

A core drill rig will be used to sample from the surface of the ground to bedrock. If this is not practical, manual digging, drilling, or powered drills may be used to collect material at depth.

The actual location of the samples taken will be as close as possible to the marked locations of Figure 1, but may vary somewhat in consideration of topography, stability for the drill rig, etc. The actual location used will be recorded in the project log and coordinated to the survey grid system.

Core samples will be taken using the following steps:

- 1) Note the location of the core sample on the project grid. Reference the sample location to the nearest foot.
- 2) Core samples shall be obtained through the soil column until bedrock is encountered.
- 3) The soil core will be removed from the drilling tool. The core will be divided into two foot sections. Any remainder that does not extend two feet will be used as a sample source, but the actual length of the core will be documented.
- 4) For each depth section:  
  
Mix the soil well, breaking up any clumps.. Fill a Marinelli beaker (nominally 0.5 liter) with the mixed soil. Seal the Marinelli beaker with tape and label with the sample identifier. Ensure the grid location, depth of sample, and date of sampling are noted.  
  
Fill an additional 1 liter container with the remaining soil. Seal and label the second container with the same information as the primary sample. This container will be retained as a backup sample for "split" analyses, radiochemical analyses, or similar additional sampling.
- 6) Record the pertinent sample location data on the Chain of Custody Form. Include both the grid location and the depth of the sample portion (e.g., "0-2 foot", "2-4 feet," etc.)
- 7) Enter the sample data on the Chain-of-Custody form for gamma spectrometry.

## **2.6 Data Interpretation and Followup Work**

Analytical results will be inspected by use of the statistical analysis software CumPlot. A statistical mean (or average contamination level) and a "test statistic" (showing a probable maximum activity level) will be generated. The "test statistic" value shall be below the soil release limit. Averages are expected to be well below the soil release limits (See Ref 5).

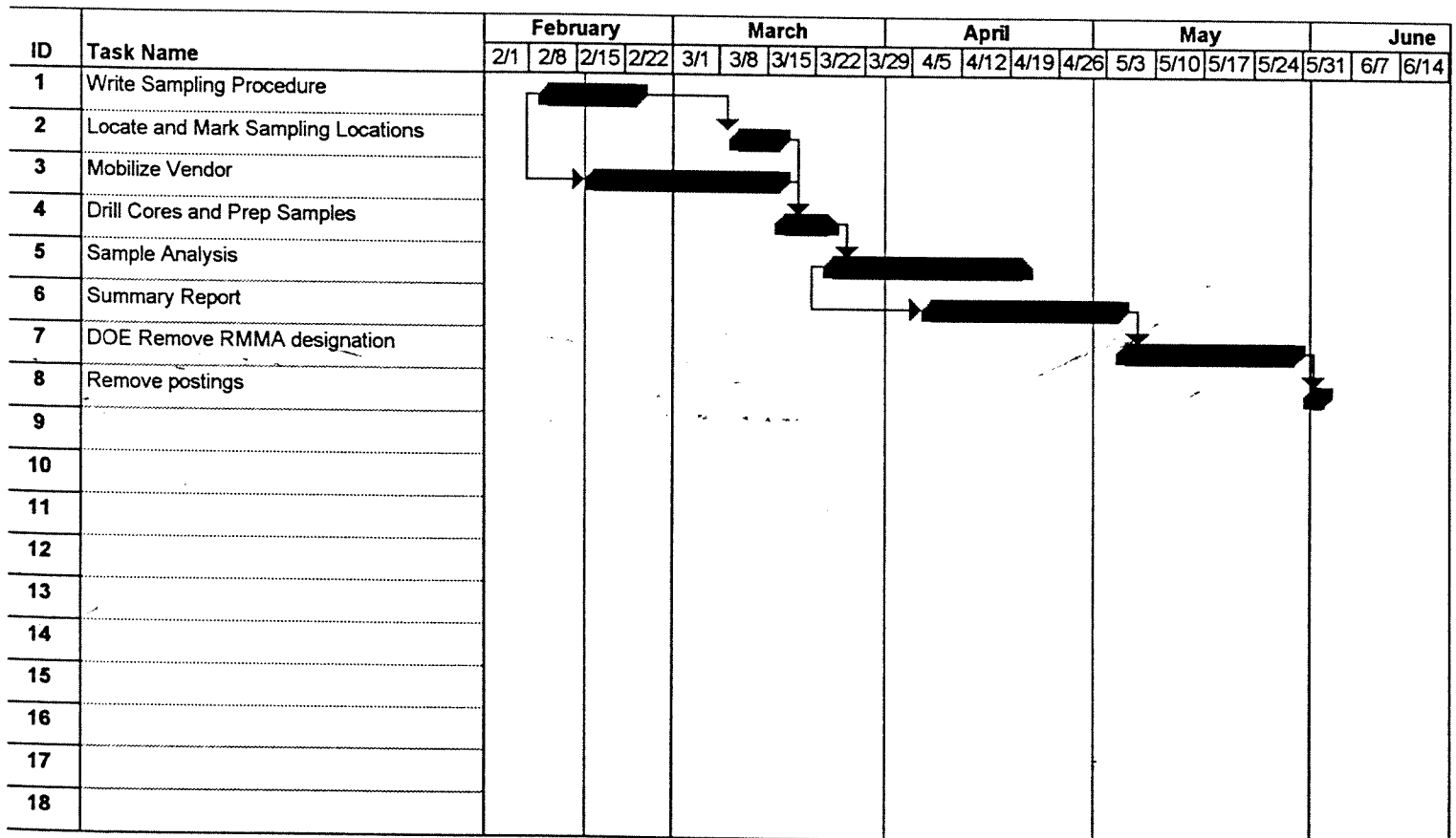
Areas with indications of contamination will be investigated further, to determine the need for any additional remediation activities.

## 2.7 Time Requirements

The following estimates of project duration are provided for planning purposes. These estimates include only the basic scope of work described in this procedure, and are subject to change:

- 1) Mobilization of Vendor: 4 weeks
- 2) Area Survey and Marking: 1 weeks
- 3) Core Drilling and Sample Prep: 1 weeks
- 4) Sample Analysis: 4 weeks
- 5) Summary Report Preparation: 4 weeks

The total duration of the project is estimated to be approximately 12 weeks from start of area preparations.



### 3. DOCUMENTATION

#### 3.1 Work Documents

A daily log shall be maintained during the survey project, describing all significant events during the sampling. This log shall be maintained with the project documents.

All photographs taken to document the project will be annotated with a caption describing the location, description of the activity, and date of the photograph. These photographs shall be included as part of the working papers of the project.

#### 3.2 Survey Records

All maps, sketches, and other documentation of work-in-progress shall be retained with the working papers of the project. All data generated shall be retained in the ETEC document control system.

All samples shall be logged into a sample log, listing the grid location, date of sample, type of sample, and the sample identifier linking to the chain of custody form submitted to the gamma spectroscopy laboratory. This log shall be retained as part of the project files.

All samples shall be submitted with a properly completed Chain of Custody form. This form is available from Radiation Safety.

#### 3.3 Report

A brief final survey report will be prepared. This report will provide the details of the survey, copies of the survey records, and a listing of the measurements recorded. The results of gamma-spectrometry, specifically for Cs-137 and supplementally for other radionuclides, such as K-40 and the natural thorium and uranium chain, will be listed. The listing of results will include the analytical value, its assigned  $2\sigma$  uncertainty, and the laboratory Minimum Detection Level. The results will be interpreted by use of CumPlot to display the distribution of background and contaminated activities.

The report will include maps with the core sample locations and a connection to the State of California master geographic grid.

A data package for the survey files will be prepared at the completion of the survey and report. This package will include a copy of this procedure as marked up, a copy of the survey report, project logs, and copies of all analytical reports. Photos and other supplemental information will be included as appropriate.

#### 4. REFERENCES

1. Rocketdyne Document N001SRR140127, "Proposed Sitewide Release Criteria for Remediation of Facilities at the SSFL", 8/22/96
2. ETEC Document A4CM-ZR-0011, "Area IV Radiological Characterization Survey", August 15, 1996
3. ETEC Document A4CM-SP-0001, "SSFL Area IV Gamma Survey Procedures in Support of the Site radiological Characterization Study", 9/20/94
4. DOE Order 5400.5, "Radiation Protection of the Public and the Environment"
5. Rocketdyne System of Procedure (RSOP) GUIDE C-401.02, "Radiological Standards." Table 2-2).

FACILITY OR PROJECT  
NAME AND PROGRAM NO.:

DOCUMENT NO.

REV.

TITLE

NO. OF  
SHEETS

YES

CONCEPTUAL

CONFIGURATION  
SUMMARY RECORD

NO

TYPE OF RELEASE

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Building 64 Side Yard Core Sampling Plan

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